CTO Update for Technology Committee

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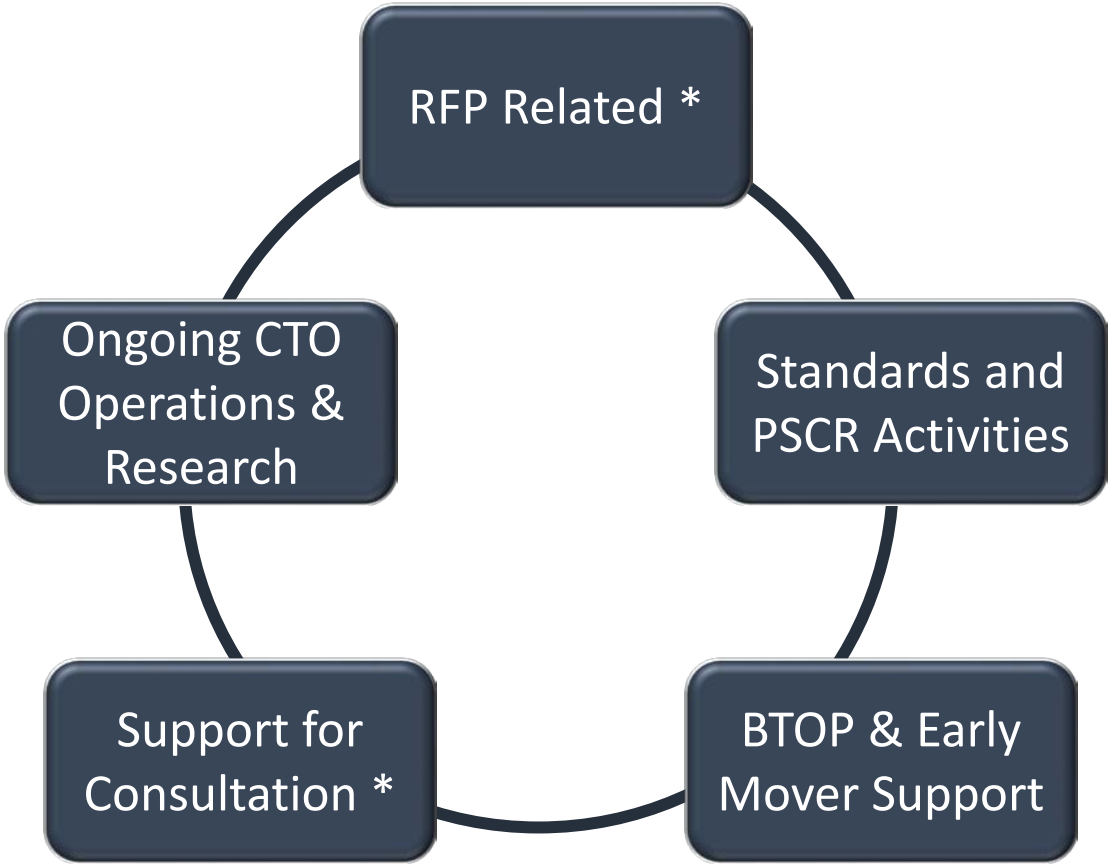
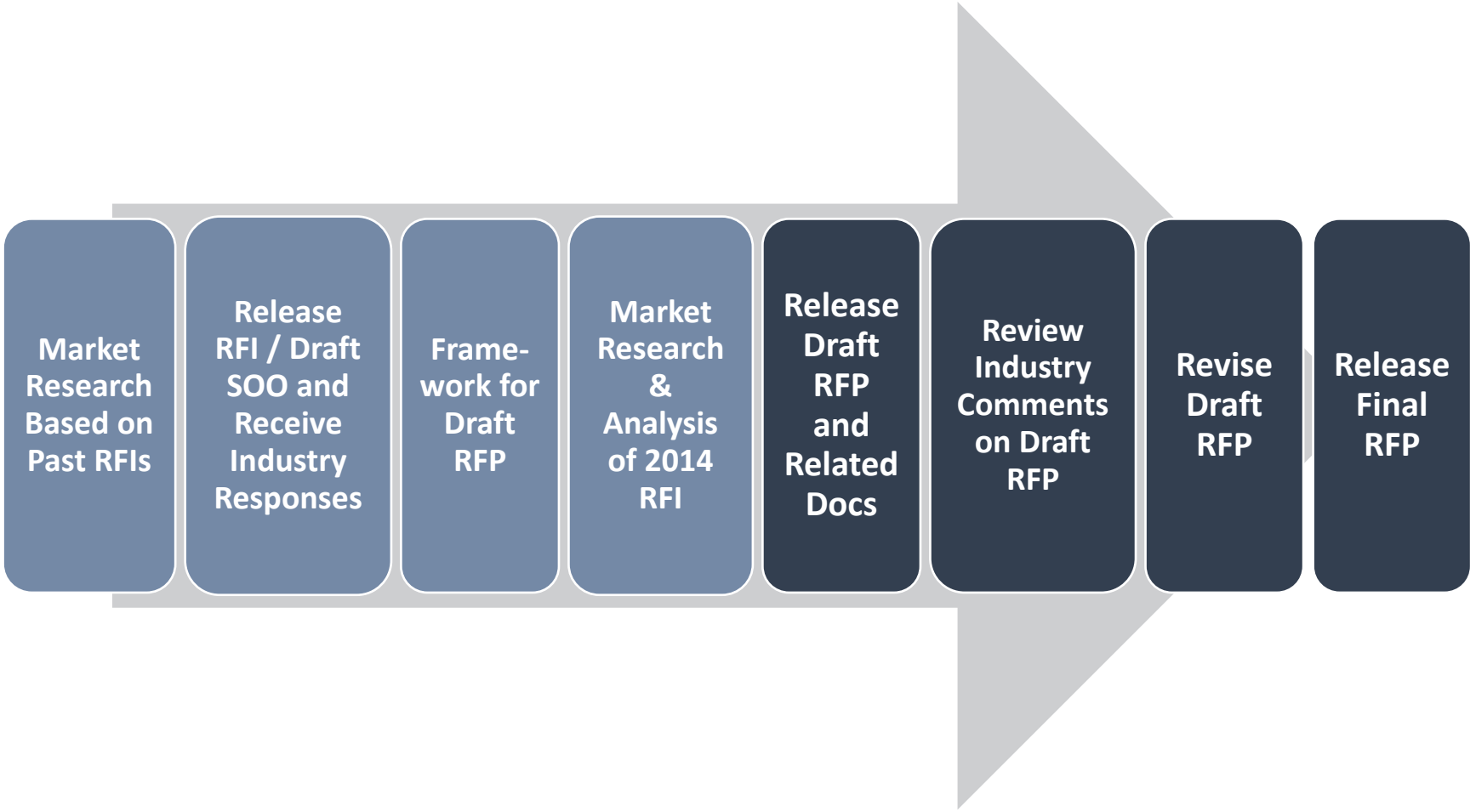
CTO Focus Areas



*** FirstNet Top Priority**

Progress of Key Technical Acquisition Documents

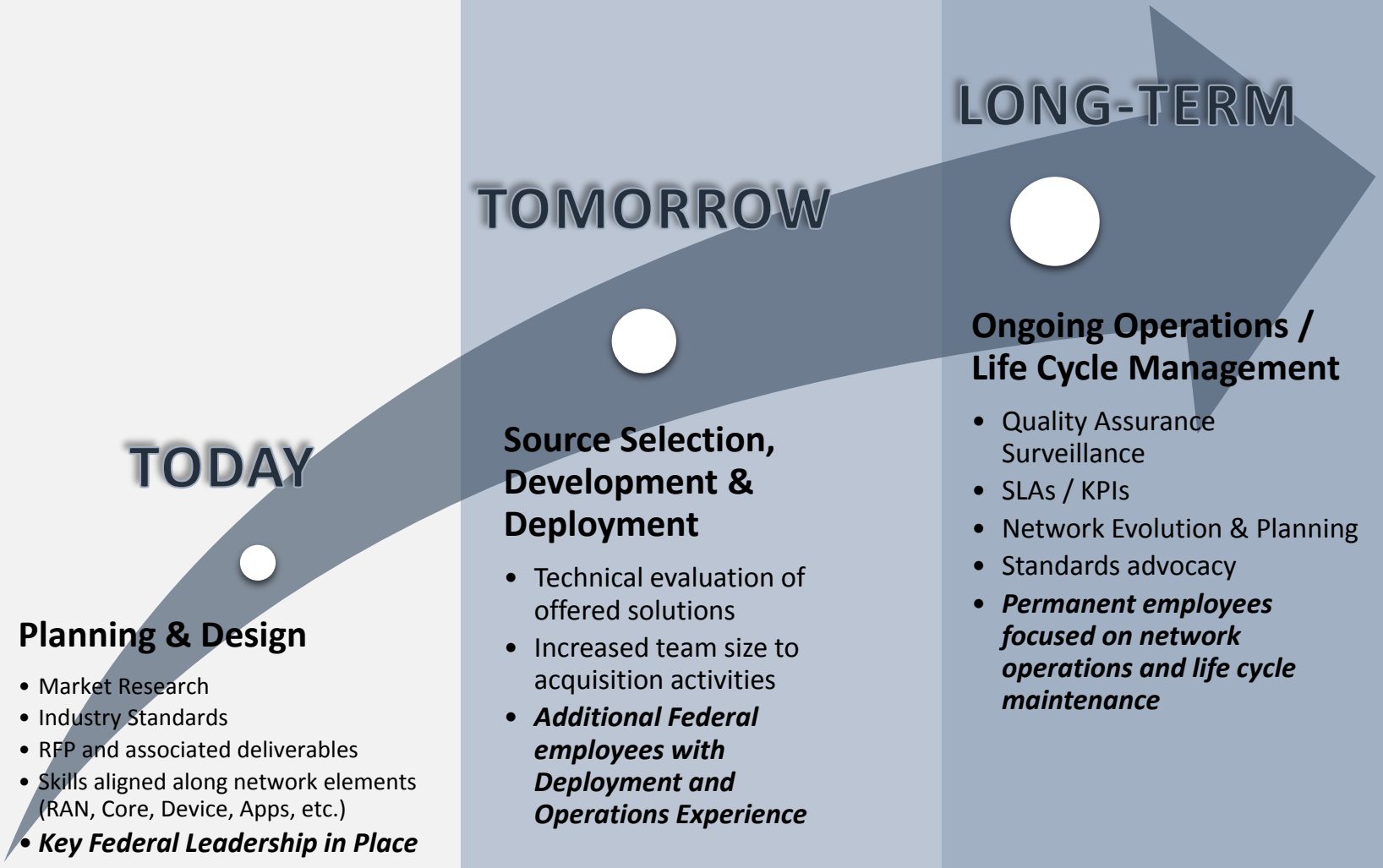


CTO Team Contribution to the RFP – Documents Are In Progress

FirstNet™

Report that answers the question of whether offerors can meet FirstNet needs. Requires analysis of 1000s of pages submitted by vendors, states, and trade associations	Describes the lifecycle of the network and how it will evolve over time, including a change management strategy	Breakdown of FirstNet and the NBPSN into business and technical functions with delineation of FirstNet functions from partner(s) or shared. System and tech arch views, interface specifications and a cyber security plan	Break down and explanation of each objective and definition of the information the offeror will need to provide, along with how that information will be evaluated
Market Research	**System Engineering Plan**	**Architecture**	**Instructions to Offerors & Evaluation Criteria**
Test strategy defines how FirstNet verifies the offeror has met critical milestones under both simulated and real world conditions	Quality Assurance Surveillance Plan ensures the network continues to meet the needs of public safety, even as it evolves over time. Also includes KPIs and SLAs	Strategy to test new products, features and capabilities while validating existing functions are not adversely impacted. May include vendor labs, a FirstNet lab, an independent lab, or a combination	Process is managed by the Source Selection Chair. Technical team will be a key participant in analyzing the offerors' capabilities, be they written, oral, or demonstrated
Operational Test & Evaluation	**Performance Monitoring**	**Lab Strategy**	**Source Selection Engineering Evaluation**

CTO Organization Evolution



TODAY

Planning & Design

- Market Research
- Industry Standards
- RFP and associated deliverables
- Skills aligned along network elements (RAN, Core, Device, Apps, etc.)
- ***Key Federal Leadership in Place***

TOMORROW

Source Selection, Development & Deployment

- Technical evaluation of offered solutions
- Increased team size to acquisition activities
- ***Additional Federal employees with Deployment and Operations Experience***

LONG-TERM

Ongoing Operations / Life Cycle Management

- Quality Assurance Surveillance
- SLAs / KPIs
- Network Evolution & Planning
- Standards advocacy
- ***Permanent employees focused on network operations and life cycle maintenance***

Identity, Credential, and Access Management (ICAM)

- **Devices can be shared by multiple users**
  - Cannot assume one-device-to-one-user
  - One user may have multiple devices
  - One device may have multiple users
- **Local control of user's identities**
  - Provisioning of first responders, roles, and attributes
  - Incorporation of more than 60,000 public safety agencies
- **Role and attribute-based access control**
  - Authorization for services and applications
  - Prioritization of public safety traffic during an incident
- **Management of diverse credentials**
  - Support multiple authentication methods
  - Ease of use required in the field, i.e., Single Sign On (SSO)

Cyber Security

- Effective cyber security is critical to FirstNet's success
- FirstNet collaborates with the Department of Homeland Security's (DHS) Office of Cyber Security and Communications, as well as other Federal agencies
- We will leverage DHS tools that will be integral to FirstNet's Cyber Security Strategy

PSCR Supports FirstNet in 3 Key Areas

EVALUATION

- **What's working?**
  - Priority Pre-emption of bearers
  - ARP and QCI Configuration
  - Basic admission control
  - Basic packet scheduling
- **What is under investigation?**
  - Preemption triggers
  - Advanced admission control capabilities
- **What may need development?**
  - Establishment cause support
  - IMS based priority features (eMPS, Advanced Priority HSS/SPR)

Evaluation & Test

Modeling & Simulation

Standards

PSCR Supports FirstNet in 3 Key Areas (continued)

TEST

- **Current Focus (Allocation Retention Priority)**
  - User/Bearer Pre-emption
  - Bearer Admission
  - Bearer Modification
  - Congestion and Overload
- **On Deck (QoS Class Identifier)**
  - QoS/Traffic Flow
  - Packet Flow and Treatment
- **Looking Ahead**
  - Access Class
  - Emergency Services
  - Phase 2 Use Cases

Evaluation & Test

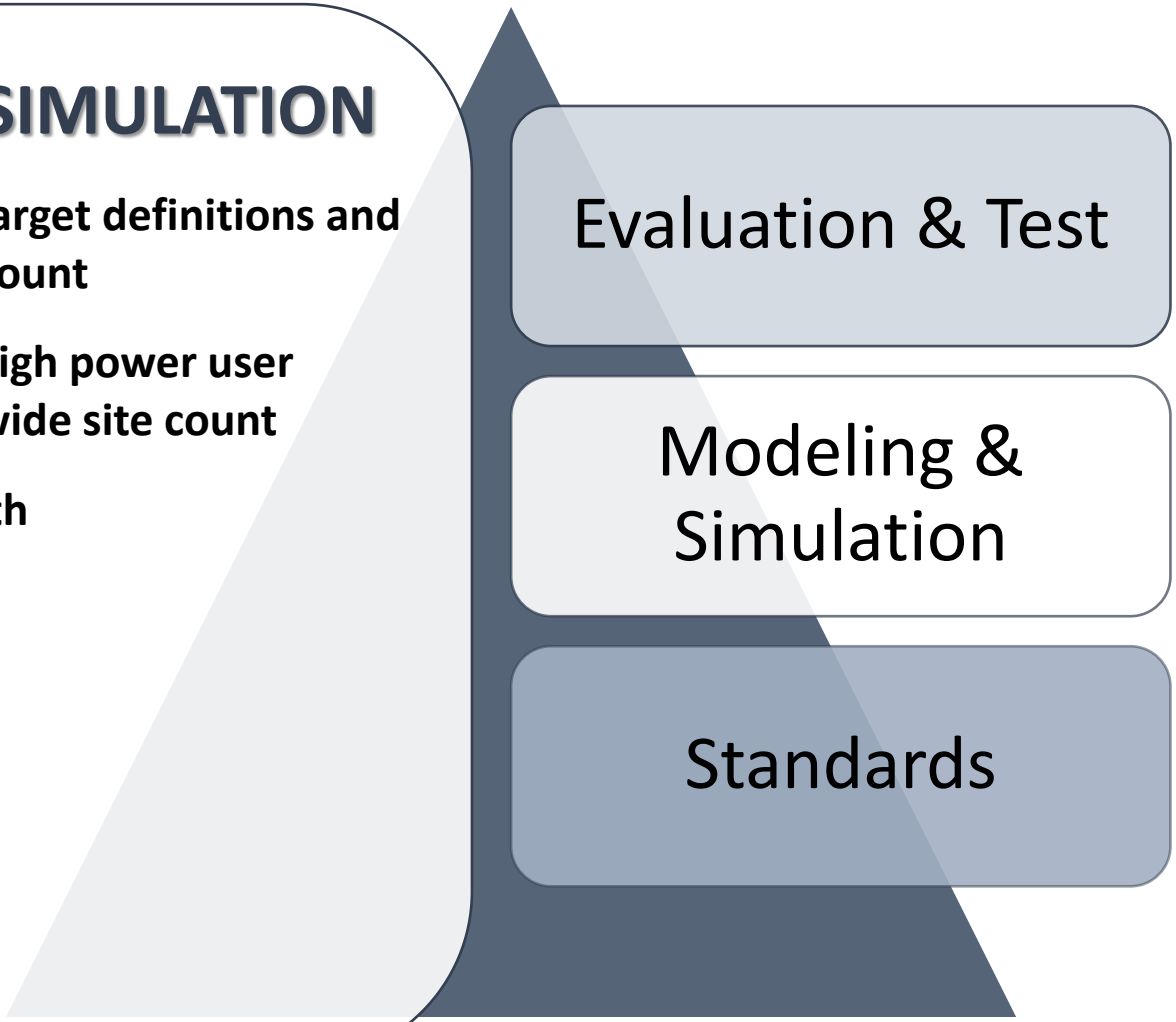
Modeling & Simulation

Standards

PSCR Supports FirstNet in 3 Key Areas (continued)

MODELING & SIMULATION

- Model the impact of target definitions and configuration on site count
- Model the impact of high power user equipment on nationwide site count
- Impact of traffic growth
- Network Resiliency



PCS Type Certification Review Board (PTCRB)

- PTCRB certifies GSM, UMTS, and LTE devices for North American operators

- FirstNet participates directly in the PTCRB to ensure:
  - Band Class 14 devices are certified to be compliant with 3GPP
  - Processes in place for interoperability testing (device to RAN) as part of Band Class 14 device certification

- High power UE test regimen underway (though impeded by availability of high powered Band 14 devices)

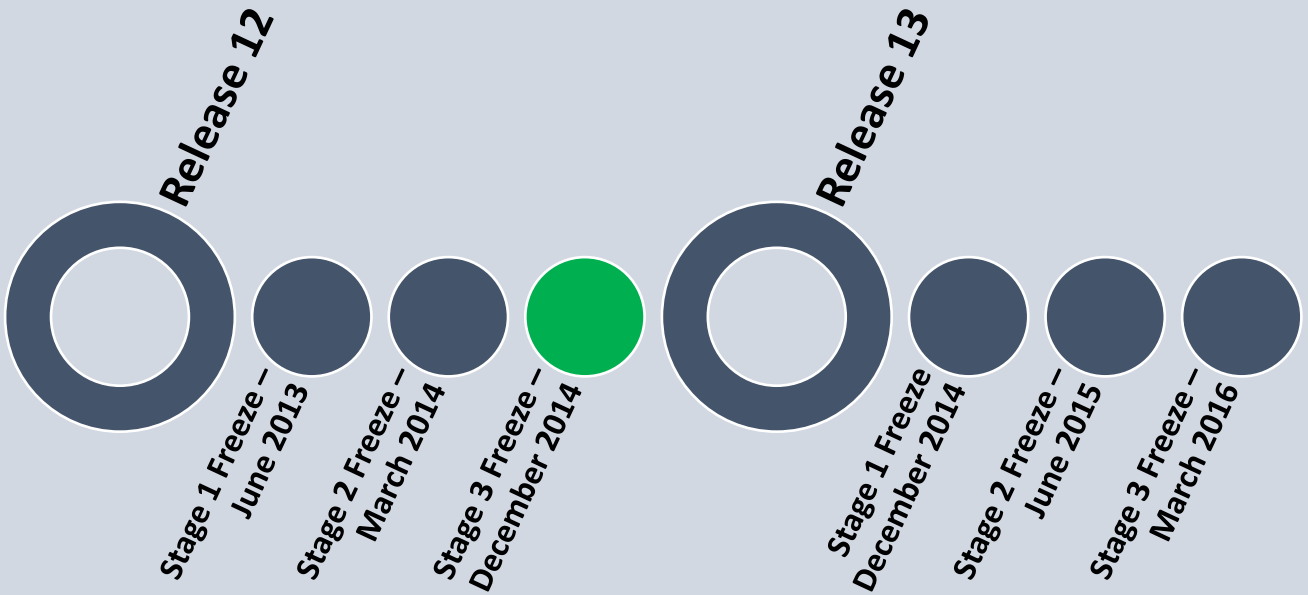
FirstNet Features in the 3GPP Standard

Mission Critical PTT: Release 13

Proximity Services: Release 12 & 13

Group Communications System Enablers: Release 12 & 13

FirstNet feature needs are also supported by the UK, South Korea, Australia, and Canada



BTOP/Public Safety LTE Deployments

"FirstNet will provide technical support to these projects and will share any lessons learned with the broader public safety community to enable the successful implementation of FirstNet's nationwide deployment."

Project	SMLA	KLCP	Sites	Key Learnings	On-Air
1. LA-RICS	Yes	Yes	229	Quality of Service, priority/pre-emption	3Q15
2. NM	Yes	Yes	9	Hosted core, int'l border spectrum management, Federal partnerships	2Q15
3. NJ	Yes	Yes	31	Deployable assets, DR/COOP, training exercises, NOC notification	2Q15
4. ADCOM	Yes	In-Progress	17	PSCR/FirstNet test support, BC 14 device testing	NOW
5. TX	Yes	In-Progress	13	KLCP nearly complete (5 KLCs including core transition, data analytics, and extended modes)	NOW

SMLA: Spectrum Manager Lease Agreement
KLCP: Key Learning Conditions Plan

BTOP/Public Safety LTE Deployments (continued)

New Jersey

- Network based on Deployables in the form of COWs and SOWs in Atlantic City, Route 21, and Camden are focus areas
- Learnings focused on deployables, satellite backhaul, and NOC operations
- On track for initial services in Jan 2015, full service 2Q2015

Harris County, Texas

- 3 year agreement with funds from the Port Authority and local contributions
- Currently 13 sites on air, 81 in planning phase
- Key learning agreement in negotiation

New Mexico

- Up to 7 existing county, state and 2 or more federally-owned towers to provide LTE service
- Shared core with another BTOP
- Purchase agreement awarded
- MOU in place with DOI

Adams County, Colorado

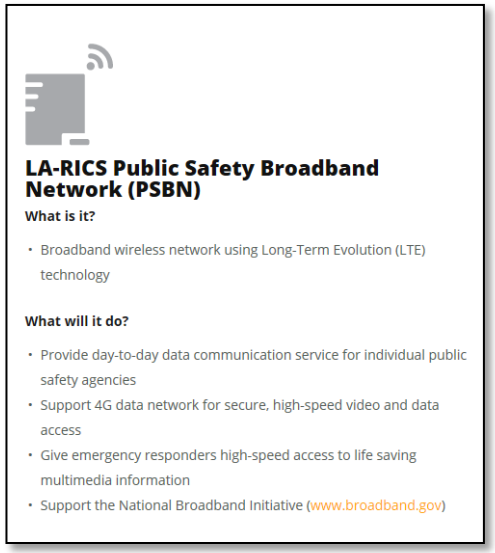
- 16 Site Network planned (15 are now on-air)
- 2,000 first responders within 1,200 square miles
- Key Learnings Agreement in negotiation
- Outfitted police car with PSBN modem, tested SIM Card

BTOP/Public Safety LTE Deployments (continued)

LA-RICS

- Original plan for PSBN network design of 232 sites covering 4,060 square miles and 34,000 first responders

- Regulatory issues delayed start of construction, which is now underway at LA County sites
  - LA County site access agreements in place (119 sites), and LA City site access agreements approved 11/12/14 (58 sites)
  - Independent cities moved to 2015 start



LA-RICS Public Safety Broadband Network (PSBN)

What is it?

- Broadband wireless network using Long-Term Evolution (LTE) technology

What will it do?

- Provide day-to-day data communication service for individual public safety agencies
- Support 4G data network for secure, high-speed video and data access
- Give emergency responders high-speed access to life saving multimedia information
- Support the National Broadband Initiative (www.broadband.gov)

Thank You